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INTERNATIONAL BIOLOGICAL PROGRAMME

SECTION PM (PRODUCTIVITY MARINE)

BIBLIOGRAPHY ON METHODS OF STUDYING THE MARINE BENTHOS

Edited by
A. D. McIntyre

FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS
ROME, 1970

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FAO Fisheries Circular **FIR /C (No.)**
FAO Fisheries Synopsis **FIR /S (No.)**

Special groups of synopses are identified by symbols followed by classification numbers based on indexed code of " Current Bibliography ":

SAST	Data concerning certain species and fish stocks.
MAST	Information on methods and subjects.
OT	Oceanographic data.
IT	Limnological data. and
CART	Information concerning fisheries and resources of certain countries and regions (FID/S).

Des catégories spéciales de synopses sont identifiées à l'aide de symboles suivis des chiffres de classification basés sur le code d'indexation de la « Current Bibliography »:

SAST	Données sur certaines espèces et populations de poissons.
MAST	Renseignements sur des méthodes et des sujets.
OT	Données océanographiques.
IT	Données limnologiques. et
CART	Renseignements sur les pêcheries et les ressources de certains pays et régions (FID/S).

Grupos especiales de sinopsis se distinguen con las siglas siguientes, seguidas por números de clasificación que se basan en las claves de los índices de la « Current Bibliography ».

SAST	Datos relativos a ciertas especies y poblaciones.
MAST	Sinopsis sobre métodos y materias.
OT	Sinopsis sobre oceanografía.
IT	Sinopsis sobre limnología. y
CART	Información sobre los recursos acuáticos vivos de algunos países y regiones (FID/S).

FAO Fisheries Technical Paper **FIR /T (No.)**

Special groups of Technical Papers are identified by:

RE	Indexed lists of experts and institutions drawn from Registers maintained by the Fishery Resources Division.
CB	Lists of periodicals, special sections of " Current Bibliography for Aquatic Sciences and Fisheries ", special bibliographies and papers concerning documentation problems.
MFS	Provisional editions of " FAO Manuals in Fisheries Science."

Some documents also have another identification, if, for example, they have been contributed to a meeting for which papers have been numbered according to another system.

Des catégories spéciales de documents techniques sont identifiées à l'aide des symboles suivants:

RE	Listes indexées d'experts et institutions tirées des registres tenus à jour par la Division des ressources halieutiques.
CB	Listes de périodiques, des sections spéciales de la « Current Bibliography for Aquatic Sciences and Fisheries », des bibliographies particulières et des articles sur les problèmes de documentation.
MFS	Editions provisoires des « Manuels FAO de science halieutique ».

Il arrive que certains documents portent d'autres numéros d'identification, comme c'est le cas s'ils ont été préparés pour une réunion dont les documents ont été marqués à l'aide d'un autre système.

Grupos especiales de documentos técnicos se identifican por las siglas siguientes:

RE	Listas índices de expertos y de instituciones tomadas de los registros que se llevan en la Dirección de Recursos Pesqueros.
CB	Listas de periódicos, secciones especiales de la « Current Bibliography for Aquatic Sciences and Fisheries », bibliografías especiales y trabajos relativos a los problemas de documentación.
MFS	Ediciones provisionales de los « Manuales de la FAO de Ciencias Pesqueras ».

Algunos documentos tienen también otra identificación si, por ejemplo, son contribuciones a una reunión cuyos documentos han sido marcados con arreglo a otros sistemas.

FAO Fisheries Technical Paper No. 98 FIRS/T98
(Distribution restricted) CB-Bibliography

INTERNATIONAL BIOLOGICAL PROGRAMME

SECTION PM

(PRODUCTIVITY MARINE)

BIBLIOGRAPHY ON METHODS OF STUDYING THE MARINE BENTHOS

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FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS
Rome, October 1970

PREPARATION OF THIS PAPER

This bibliography was compiled by members of the Drafting Committee appointed by the PM section of the IBP to supplement a handbook on benthos research methods, edited by Mr. Holme and Mr. McIntyre. In order to secure the widest circulation, the present paper is published in the FAO Technical Paper series by the Fishery Resources Division. The bibliography is classified under detailed subject headings and supplemented by a check-list of benthos sampling gear.

Distribution

FAO Department of Fisheries
FAO Regional Fishery Officers
IBP (PM)
Authors
Selector SM

"Current Bibliography" entry

McIntrye, A.D. (Ed.)(1970) 17-7M007
FAO Fish.tech.Pap., (98):96 p.
International Biological Programme,
Section PM (Productivity Marine).
Bibliography on methods of studying
the marine benthos

Special bibliography by authors and subjects. Surveys. General ecology. Properties of environment. Observation and collection of fauna - epibenthos, endobenthos. Phytobenthos - productivity. Secondary production. Sampling gear.

FOREWORD

The rapid increase in the numbers and needs of the human populations of the world, with the associated demands on the natural environment, have greatly increased the need for biological research. In an attempt to meet this need, the International Council of Scientific Unions (ICSU) has initiated the International Biological Programme (IBP) with the objective of ensuring world-wide studies of the biological basis of organic production. The IBP is divided into seven sections: four dealing with aspects of terrestrial biology, the others being concerned with human adaptability, the biology of freshwaters and (Section PM) the seas.

The programme of Section PM is aimed at improving understanding of the basic ecological mechanisms which control the abundance, distribution and productivity of marine organisms. The main emphasis lies in studies of those regions which are accessible to man, such as coastal waters, littoral zones, estuaries, lagoons and the continental shelf. These are the regions which offer the most immediate prospect of improving resources through human intervention. They are also the regions most affected by man's activities, including pollution. An outline of the PM programme is given in IBP News No. 18 (March, 1969) which includes a list of more than 250 research projects from 31 countries, divided into the following themes:

A. Comparative ecology in different climatic regions.

B. Modification of the environment by man's activities.

C. Cultivation of marine organisms.

D. World-wide study of selected organisms (mussels, mullets, corals and mammals).

One of the initial targets of many of the Sections of the IBP has been the production of Handbooks of Methods, both as a general service to biological research and as an attempt to achieve comparability of results if not standardization of techniques. In the marine field, however, the need for such handbooks is being met by other international organizations, especially by the Working groups of SCOR (the Scientific Committee for Oceanic Research, a committee of ICSU), FAO and Unesco; see, for example, the first two numbers of the Unesco Monographs on Oceanographic Methodology, dealing with "Determination of photosynthetic pigments in sea water" and "Zooplankton sampling". Therefore, it was decided that Section PM of the IBP should not attempt to produce handbooks which, inevitably, would duplicate or overlap those published or planned by these international bodies. Instead, IBP/PM is collaborating with SCOR and other organizations as joint sponsors of Working Groups dealing with such matters as the "Estimation of Primary Production under Special Conditions", "Continuous Monitoring in Biological Oceanography" and "Phytoplankton Methods". Some or all of these Working Groups will produce manuals of methods.

There is one subject, however, which does not appear to be covered by the existing plans of any other international organization. This is the benthos.

Therefore, the PM Section of the IBP undertook to repair this omission. The topic was first discussed by a small working group consisting of Dr Z. A. Filatova (USSR), Professor G. Thorson (Denmark) and Professor D. J. Crisp (UK). It was agreed that a Handbook should be published. A Drafting Committee was appointed with the following membership (all from the UK).

Professor D.J. Crisp, Chairman (Menai Bridge, Marine Science Laboratories, University College of North Wales).

Mr E. I. S. Rees, Secretary (Menai Bridge, Marine Science Laboratories).

Mr L. Birkett (Lowestoft, Fisheries Laboratory, MAFF).

Mr N. A. Holme (Plymouth, The Laboratory, MBA).

Dr N. S. Jones (Port Erin, Marine Biological Station, University of Liverpool).

Mr A. D. McIntyre (Aberdeen, Marine Laboratory, DAFS).

Dr F. E. Round (Department of Botany, University of Bristol).

Others who have assisted in the preparation of the handbook include Dr Joanna Kain (UK), Dr J. B. Buchanan (UK), Dr M. Hickman (UK) and, during a technical meeting in Arcachon in September 1968, Professor Robert Weill (France), Dr Z. A. Filatova (USSR), Dr J. Pearce (USA), Dr H. L. Sanders (USA), Dr K. Banse (USA) and Professor G. Thorson (Denmark).

The handbook, edited by Mr Holme and Mr McIntyre, will be published by Blackwell in the Series of IBP Handbooks. It will include a list of references to papers quoted in the text. However, it was felt that a fuller bibliography of research on the benthos was needed to supplement the handbook. A first draft was prepared by members of the drafting committee and subsequently edited and brought up to date by Mr McIntyre. In order to secure the widest circulation, the bibliography is published and circulated by the Fishery Resources Division of FAO.

All those associated with the preparation of the Handbook and the Bibliography are aware that this is a period of rapid development in the marine sciences. It may prove necessary to revise both publications after a relatively short period of time.[1] They do not claim to be comprehensive; their aim is to provide growing points and to facilitate the development of new projects of research on the benthos. I am confident that the Handbook and the Bibliography form valuable bases which will be used widely both within and outside the IBP.

I would like to take this opportunity to thank all those people (named above) who have contributed to these publications. In particular, I must mention Professor Crisp, who acted as Chairman of the drafting committee, Mr Holme and Mr McIntyre who edited the Handbook, and Mr McIntyre again, for editing the Bibliography and bringing it up to date.

We are grateful to the British National Committee for the IBP which provided the greatest part of the funds for the activities of the drafting committee. We acknowledge the hospitality of Professor R. Weill who offered his laboratory for the Technical Meeting in Arcachon. Finally, I must acknowledge our debt to the Fishery Resources and Exploitation Division of FAO, not only for printing and circulating this Bibliography, but also for preparing the copies of the first draft of the Handbook and the Bibliography for the meeting at Arcachon.

Oceanographic Laboratory,
Edinburgh.
September, 1969.

R.S. Clover
Convener
Section PM/IBP

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[1] References are being numbered in order to facilitate future revisions and, eventually, the preparation of geographic, taxonomic or other indexes as authors might consider necessary.

ARRANGEMENT OF THE BIBLIOGRAPHY

The references are arranged in sections which correspond roughly to the major divisions of the forthcoming IBP Handbook on Methods for the Study of Marine Benthos. For the convenience of the user, cross-referencing has been avoided and any citation which is of major importance in more than one section is repeated entire. A check-list of benthos samplers with references to published descriptions is appended.

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Excretion of radio-isotopes as indices of metabolic rates in nature: biological half life of Zinc-65 in relation to temperature, food consumption, growth and reproduction in arthropods

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A miniature bomb calorimeter for small biological samples

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Carbohydrates in some marine planktonic animals

Read, K.R.H. (1962) 1332
Comp.Biochem.Physiol., 7:89-101
Respiration of the bivalve molluscs Mytilus edulis L and Brachidontes demissus plicatulus Lamarck as a function of size and temperature

Richman, S. (1958) 1333
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The transformation of energy by Daphnia pulex

Sandison, E.E. (1966) 1334
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The oxygen consumption of some intertidal gastropods in relation to their zonation

Savage, R.E. (1925) 1335
Fishery Invest., Lond., Ser. 2, 8(1):50 p.
The food of the oyster

Scholander, P.F. et al. (1952) 1336
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Micro-volumetric respirometry. Methods for measuring O_2 consumption and CO_2 production by cells and enzymatic reactions

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A method for recording measurements of certain molluscs, arthropods and fishes

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Water, nitrogen and calorific values of freshwater animals

Slobodkin, L.B. (1959) 1339
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Energetics in a Daphnia pulex population

Slobodkin, L.B. & S. Richman (1961) 1340
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The caloric content per ash-free gram of seventeen species of animals

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In Physical methods of organic chemistry, Pt. I, ed. A. Weissberger, New York & London, Intersci.Publ., Ch. 10
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Suschenya, L.M. (1962) 1342
Dokl.Akad.Nauk SSSR, 143: 1205-7
Quantitative data on nutrition and energy balance in Artemia salina (L)

Walne, P.R. (1963) 1343
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Observations on the food value of seven species of algae to the larvae of Ostrea edulis

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A physiological study of the development of the egg of Fasciola phepatica L., the common liver fluke

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Body size and metabolic rate in the animal kingdom with special regard to marine microfauna

CHECK-LIST OF BENTHOS SAMPLING GEAR

This check-list mainly includes samplers coming into section 4.3 of the Bibliography. Underwater cameras, T.V., and diving methods are not included.

A. List of samplers included in previous reviews

Samplers are classified by their name, following in general that used by Hopkins. The review in which a description or reference to each sampler is given as shown thus:

HK (Hopkins, 1964. Progr.Oceanogr., 2:213-56)

HM (Holme, 1963. Adv.mar.Biol., 2:171-260)

TH (Thorson, 1957. Mem.geol.Soc.Am., 67(1):61-73)

GN (Gunter, 1957. Mem.geol.Soc.Am., 67(1):73-80)

This list includes most of the commonly used instruments up to 1963.

B. Other and more recent samplers

Including samplers described after 1963 or omitted from the reviews cited above. Listed under author's name.

CHECK-LIST OF BENTHOS SAMPLING GEAR

A. List of samplers included in previous reviews

AGASSIZ or SIGSBEE TRAWL GN (p. 75)

"ALBATROSS" CORER HK (Fig. 39)

ALLAN GRAB HK (Fig. 22) TH (p. 67)

ANCHOR-DREDGE (ADJUSTABLE) HM (p. 187)

ANCHORS (MODIFIED) HK (Fig. 107)

AUERBACH IMPACT CORER HK (Fig. 55)

AVILOV UNDERWAY SAMPLER HK (Fig. 93)

BAILLIE ROD HK (Fig. 26)

BAIRD GRAB HM (p. 200)

BALL'S DREDGE HM (p. 181)

BANKS MANUAL CORER HK (p. 240)

BEAM TRAWL GN (p. 75)

BEAUCHAMP SLEDGE DREDGE TH (p. 73)

BEIRI AND BRADSHAWL EPIBENTHIC DREDGE HM (p. 191) GN (p. 75)

BELKNAP-SIGSBEE CORER HK (Fig. 27)

BERGMANN MUD BUCKET HK (Fig. 97)

BEYER EPIBENTHIC CLOSING NET HM (p. 191)

BIRGE-EKMAN GRAB HK (Fig. 11) TH (p. 67)

BOSSANYI BOTTOM NET HM (p. 191)

BROOKE'S SOUNDING DEVICE HK (Fig. 104)

BUCHANAN COMBINED WATER SAMPLER AND BOTTOM CORER HK (Fig. 82)

"BULLDOG" GRAB HK (p. 220)

CABLE-TYPE CORER HK (Fig. 30)

CAMPBELL GRAB HM (p. 194)

CAMPBELL GRAB WITH CAMERA HM (p. 211)

CANAL MANUAL CORER HK (Fig. 78)

CONICAL DREDGE HM (p. 183)
CONICAL DREDGE OF BOURCART AND BOILLOT HM (p. 186)
CUPLEAD SAMPLER HK (Fig. 102)

DAVIS MANUAL PEAT CORER HK (Fig. 79)
DENDY INVERTING MANUAL CORER HK (Fig. 80)

EKMAN CORER HK (Fig. 33
EKMAN-LENZ GRAB HK (Fig. 12) TH (p. 67)
EKMAN GRAB HK (Fig. 20) TH (p. 67)
ELLMS SAMPLER HK (Fig. 105)
EMERY BACTERIAL SAMPLER HK (p. 250)
EMERY GRAB HK (Fig. 6)
EMERY "PIPE" HK (Fig. 96)
EMERY-DIETZ CORER HK (Fig. 32)
EMERY & CHAMPION UNDERWAY BOTTOM SAMPLER HK (Fig. 92)
ENEQUIST CORER HK (Fig. 46) HM (Fig. 13 & p. 206) TH (p. 70)
EWING AND LUDAS PISTON CORER HK (Fig. 65)

"FISH HAWK" CLAMSHELL GRAB HK (Fig. 15)
FITZGERALD SEDIMENT SCOOP HK (Fig. 85)
FOERST "PETERSEN" GRAB HK (Fig. 5)
FORSTER ANCHOR-DREDGE HM (p. 186) GN (p. 74)
FRANKLIN-ANDERSON GRAB HK (Fig. 17)

G.M. MANUAL IMPACT CORER HK (Fig. 77)
GILSON BUCKET HK (p. 245)
GINSBURG AND LLOYD MANUAL PISTON CORER HK (p. 240)
GORDEEV PRISM GRAB HK (Fig. 20) HM (p. 195)
GUSTAFSON RING DREDGE HM (p. 183) GN (p. 74)

HANNA MANUAL CORER HK (Fig. 76)
HOLME SCOOP SAMPLER HK (Fig. 86) HM (p. 200, etc) TH (p. 65)

HOLME SUCTION CORER HK (Fig. 61) HM (p. 202) TH (p. 72)

HOLME SUCTION SAMPLER HK (Fig. 88) HM (p. 202)

HJORT-RUUD COMBINED WATER SAMPLER AND BOTTOM CORER HK (Fig. 84) TH (p. 71)

HUNT SUCTION SAMPLER HK (Fig. 89) HM (p. 202) TH (p. 72)

HVORSLEV-STETSON FREE-FALLING CORER HK (Fig. 47) HM (p. 196)

"HYDRA" CORER HK (Fig. 25)

ISELIN CORER HK (Fig. 41)

JENKIN-MORTIMER CORE-CUTTER HK (Fig. 69)

JENKIN, MORTIMER AND PENNINGTON CORE-CUTTER HK (Fig. 70)

JOLY DEEP-SEA CORING TUBE HM (p. 200)

JONES MULTIPLE TUBE CORER HK (p. 233)

KELLEN SAMPLER HK (Fig. 23)

KINDLE'S "SEED TESTER" MANUAL CORER HK (p. 241)

KITAHARA SAMPLER HK (Fig. 28)

KLASSEN GRAB HK (Fig. 7) TH (p. 68)

KNUDSEN SUCTION CORER HK (Fig. 60) HM (p. 203) TH (p. 65)

KROGH-SPÆRCK MULTIPLE TUBE CORER HK (Fig. 58) TH (p. 71)

KULLENBERG PISTON CORER HK (Fig. 64) HM (p. 200)

KULLENBERG VACUUM CORE-SAMPLER HM (p. 202)

KUMADA ROCK DREDGE HK (Fig. 100)

LAFOND-DIETZ GRAB HK (Fig. 16)

LANG CORER HK (Fig. 31) TH (p. 67)

LARSON MANUAL CORER HK (Fig. 74)

LEE GRAB HK (p. 221) HM (p. 194) TH (p. 65)

LEGER GRAB HK (Fig. 3)

LIVINGSTON MANUAL PISTON CORER HK (Fig. 71)

LUGN SAMPLER HK (Fig. 98)

LUNDQUIST CORER HK (Fig. 43)

MACKARETH PNEUMATIC PISTON CORER HK (Fig. 67)

MANN BUCKET HK (Fig. 95)

MARUKAWA GRAB HK (Fig. 18)

MILLS CORER HK (Fig. 36)

MOORE FREE-CORER HK (Fig. 48)

MOORE-NEILL SHORT CORER HK (Fig. 45) HM (Fig. 27)

MORTENSEN BOTTOM NET HM (p. 191) TH (p. 73)

MULLER'S DREDGE HM (p. 173)

MULTIPLE TUBE CABLE CORER HK (Fig. 59)

NALWALK ROCK DREDGE HM (p. 183)

NAUMANN COMBINED WATER AND BOTTOM SAMPLER HK (Fig. 81)

NAUMANN IMPACT CORER HK (Fig. 54)

NIINO IMPACT CORER HK (Fig. 52)

NIINO ROCK DREDGE HK (Fig. 101)

OCKELMANN DETRITUS-SLEDGE HM (p. 191)

OKAMOTO CORER HK (Fig. 42)

OKEAN-50 GRAB HK (Fig. 2) HM (pp. 194, 196)

ORANGE PEEL GRAB HK (Fig. 21) HM (p. 206) TH (p. 69)

OTTER TRAWL GN (p. 75)

OYSTER DREDGE HM (p. 173)

PERFELEV IMPACT CORER HK (Fig. 56)

PETERSEN GRAB HK (Fig. 1) HM (p. 191) TH (p. 61)

PETERSEN GRAB (FRIEDLING MODIFICATION) HK (p. 218)

PETERSEN GRAB CLOSED BY COMPRESSED AIR HM (p. 200)

PETERSEN GRAB (ORTON MODIFICATION) TH (p. 63)

PETTERSSON IMPACT CORER HK (Fig. 49) HM (p. 200) and (p. 206) TH (p. 67)

PHLEGER CORER HK (Fig. 44) HM (p. 227) TH (p. 71)

PIGGOT IMPACT CORER HK (Fig. 57) HM (p. 200)

PLYMOUTH OVAL OR "AMPHIOXUS" DREDGE HM (p. 183)

PRINCE OF MONACO'S CORER HK (Fig. 29)

PURASJOKI SUCTION SAMPLER HK (Fig. 91)

RALLIER-DU-BATY DREDGE HM (p. 186)

"RAMMER LEAD" IMPACT CORER HK (Fig. 53A)

REISH AND GREEN MANUAL PISTON CORER HK (Fig. 72)

RENN SUCTION SAMPLER HK (p. 243)

RIEDL BOTTOM-MEASURING NET HM (p. 191) ON (p. 77)

RITTENHOUSE MANUAL CORER HK (p. 240)

ROBERTSON MUD BUCKET HK (p. 245) HM (Fig. 3)

ROCK DREDGE (OF MAGGINITIE) HM (p. 183)

ROSS "CLAMSHELL" GRAB HK (Fig. 14)

RUSSELL BOTTOM NET HM (p. 191)

SK ROCK DREDGE HK (Fig. 99)

SANDERS ANCHOR-DREDGE HM (p. 186)

SEKI GRAB HK (Fig. 9)

SHIPEK SEDIMENT SAMPLER HM (p. 205)

SJOSTEDT CORER HK (Fig. 38)

SJOSTEDT IMPACT CORER HK (Fig. 53)

SLACK CORING TUBE HM (p. 200)

SMIDT HAND CORER HK (Fig. 75)

SMITH-MCINTYRE GRAB HK (Fig. 19) HM (p. 200, etc) TH (p. 65)

SOIL AUGER HK (p. 250)

"SPUD" SAMPLER HK (Fig. 106)

STETSON-ISELIN SCOOP HK (p. 243) HM (p. 200)

STROM CORER HK (Fig. 40)

SYSOEV-KUDINOV HYDROSTATIC CORER HK (Fig. 63) HM (p. 202)

"TANGLES" HM (p. 187)

"TELEGRAPH" GRAB HK (p. 220)

TRASK CORER HK (Fig. 37)

TWENHOFEL IMPACT CORER HK (Fig. 50)

UDINTZEV AND LISITZIN PISTON CORER HK (Fig. 66)

ULSKY GRAB HK (Fig. 8)

VALLENTYNE MANUAL PISTON CORER HK (Fig. 73)

VALVE LEAD CORER HK (Fig. 24)

VAN VEEN HK (Fig. 4) HM (p. 197, etc) TH (p. 64)

VARNEY "PILE-DRIVER" IMPACT CORER HK (Fig. 51)

VARNEY-REDWINE SUCTION CORER HK (p. 236)

VARNEY-REDWINE HYDROSTATIC CORER HK (Fig. 62)

VIBRATORY PISTON CORER HK (Fig. 68) HM (p. 204)

WADDEN SKIMMER TH (p. 73)

WATER SAMPLER AND BOTTOM CORER HK (Fig. 83)

WELCH OOZE SUCTION SAMPLER HK (Fig. 90)

WICKSTEAD BOTTOM NET HM (p. 191)

WOODS HOLE CORER HK (p. 227)

WORZEL UNDERWAY "BT" SAMPLER HK (Fig. 94)

ZBEKOCHERNAZ TUBE HK (Fig. 35)

ZOUTENDYK ROCK DREDGE HM (p. 183)

B. Other and more recent samplers

Aibulatov & Susliaev (1959)
Meteorologiya i Gidrol., 12:39-40 [Abstr. in Met.geastrophys. Abstr., 14:1633]
(Rod-type excavator)

Andreson, Sollie & Richards (1964)
NATO Subcomm.Oceanogr., Res.Tech.Rep., (15) [Abstr. in Deep Sea Res., 13(3):507]
(Gas-operated corer)

Bacescu (1952)
Bull.Inst.Cerc.pisc., 11:43-51
(Bottom sampler)

Bacescu (1955)
Bull.Inst.Cerc.pisc., 14(4):25-34
(Bottom sampler)

Bacescu (1957)
Bull.Inst.Cerc.pisc., 16(2):69-82
(Bottom-sampler)

Baird (1965)
J.Cons.perm.int.Explor. Mer, 20:290-4
(Escallop dredge)

Belyaev & Sokolova (1960)
Trudy Inst.Okeanol., 39:96-100
(Sigsbee-type trawl with measuring wheel)

Benson & Kaesler (1965)
Micropaleontology, 11:369-72 [Abstr. in Deep Sea Res., 13(6)(2):1283]
(Bolapipe dredge)

Bouma & Marshall (1964)
Mar.Geol., 2:81-99
(Modified Reineck sampler)

Byrne & Kulm (1962)
Limnol.Oceanogr., 7:106-8
(Light-weight piston corer)

Carey & Hancock (1965)
Deep Sea Res., 12:983-4
(Anchor-box dredge)

Coler & Haynes (1966)
Progve Fish Cult., 28(2):95
(Benthos sampler)

Corey & Craib (1966)
J.Cons.perm.int.Explor. Mer, 30:346-53
(Meiofauna sampler)

Craib (1965)
J.Cons.perm.int.Explor. Mer, 30:34-9
(Craib core sampler)

Deguen & Molinier (1959)
Bull.Soc.linn. Provence, 22:54-7 [Recl Trav. Stn mar. Endoume,

Delamare-Debouttéville (1953)
Vie Milieu, 4:411-21
(Sampler for littoral subterranean fauna)

Elgmork (1962)
Hydrobiologia, 20:167-72
(Elgmork sampler)

Elster (1933)
Int.Rev.ges.Hydrobiol.Hydrogr., 29:290-2
(Sledge dredge)

Emery & Gould (1948)
J.sedim.Petrol., 18:14-23 [Contr. Allan Hancock Fdn (15)]
(Underway sampler)

Ewing, Woollard, Vine & Worzel (1946)
Bull.geol.Soc.Am., 57:909-34 [Coll.Repr. Woods Hole oceanogr. Instn, (351)]
(Underway sampler)

FAO (1965)
Rome, FAO, 24 p. + data sheets
(Catalogue of fishing gear designs)

Frolander & Pratt (1962)
Limnol.Oceanogr., 7:104-6
(Bottom skimming net)

Gilat (1964)
Bull.Inst.oceanogr. Monaco, 62(1290), 46 p.
(Bottom measuring net)

Gillespie & Brown (1966)
Limnol.Oceanogr., 11:404-6
(Quantitative sampler for sampling among aquatic weeds)

Gleason & Ohlmacher (1965)
Ocean Sci. Ocean Engng, 2, Mar.Technol.Soc.Am.Soc.Limnol. Oceanogr.:737-41 [Abstr. in Deep Sea Res., 13(6)(2):1366]
(Freezing core sampler)

Higgins (1964)
Bull.mar.Sci., Gulf Caribb., 14:479-93
(Sledge dredge)

Jonasson & Clausson (1966)
Mar.Geol., 4:365-72
(Grab and gravity corer)

Karling (1937)
Acta Soc. Fauna Flora fenn., 50:387-91
(Small dredge)

Klovan (1964)
J.sedim.Petrol., 34:185-98
(Sediment-coring device)

Larsonneur (1965)
Bull.Soc.linn. Normandie, 10(5):94-6
(Conical-mouthed dredge)

Lassig (1965)
J.Cons.perm.int.Explor. Mer, 29:352-3
(Modified release for van Veen grab)

Leenart (1966)
Int.hydrogr.Rev., 43:59-68
(Electronic mud probe)

Little & Mullins (1964)
Limnol.Oceanogr., 9:148-50
(Modified Blake (beam) trawl)

Livingstone (1955)
Ecology, 36:137-9
(Lightweight piston corer)

McIntyre (1964)
Limnol.Oceanogr., 9:460-1
(Box dredge)

McManus (1965)
Deep Sea Res., 12:227-32
(Large diameter corer)

Menzies (1962,1963)
In Abyssal crustacea. Vema Res. Ser., 1:79-206, 1962
/ Int. Revue ges.Hydrobiol.Hydrogr., 48:185-200, 1963 /
(Deep sea trawl)

Milbrink, G. (1968)
Oikos, 19:105-10
(A microstratification sampler for mud and water)

Muus (1964)
Ophelia, 1:209-16
(Muus-trap)

Myers (1942)
J.sedim.Petrol., 12:92-5 / Coll.Repr. Woods Hole oceanogr. Instn, (314) /
(Bottom net)

Myers (1942)
J.sedim.Petrol., 12:92-5 / Coll.Repr. Woods Hole oceanogr. Instn, (314) /
(Suction sampler)

Pierce (1965)
Bull.mar.Sci., 15:480-94
(Light sand dredge)

Posgay (1957)
Fishery Leafl. Fish Wildl. Serv.U.S., (442), 7 p.
(Scallop dredges)

Pratje (1950)
Dt.hydrogr.Z., 3:100-7
(Coring tube)

Prokopovich (1966)
Ecology, 47:856-8
(Box sampler)

Prych & Hubbell (1966)
Bull.geol.Soc.Am., 77:549-56 [Abstr. in Deep Sea Res., 13(6)(2), 1429]
(Core sampler for rivers and estuaries)

Purasjoki (1953)
Suomal. eläin-ja kasvit.Seur. van kasvit.Julk., 8:1

Radu (1952)
Bull.Inst.Cerc.piac.

Rawson (1947)
Spec.Publ.Limnol.Soc.Am., (18), 8 p.
(Automatic closing Ekman dredge)

Reineck (1958)
Senckenbergiana leth., 39:42-48; 54-56. Reineck, 1963 Natur Mus., Frankf., 93:102-8
(Reineck's kastengreifer)

Riedl (1961)
Recl Trav. Stn mar. Endoume, 23:161-9
(Bottom-measuring net)

Sachs & Raymond (1965)
J.mar.Res., 23:44-53 [Coll.Repr. Woods Hole oceanogr. Instn, (1597)]
(Unattached sediment sampler)

Saint-Hilaire (1909)
Int. Revue ges.Hydrobiol.Hydrogr., 2:449-51
(Light dredge)

Sanders, Hessler & Hampson (1965)
Deep Sea Res., 12:845-67
(Anchor dredge)

Saur, Tonolli & Verduin (1964)
Limnol.Oceanogr., 9(Suppl.), Spec.Publ. Am.Soc.Limnol. Oceanogr., (1), 32 p.
(List of suppliers)

Schink, Fanning and Piety (1966)
J.mar.Res., 24:365-73
(Sediment and bottom-water sampler)

Shier and Oaks (1966)
J.sedim.Petrol., 36:241-4
(Coring technique for unconsolidated wet sand)

Shipek (1965)
Ocean Sci. Ocean Engng. 2, Mar.Technol.Soc.Am.Soc.Limnol. Oceanogr.:999-1008 [Abstr. in Deep Sea Res., 13(6)(2), 13799]
(Composite sampler)

Steinmann (1909)
Int. Revue ges.Hydrobiol.Hydrogr., 2:452-6
(Triangular dredge)

Stetson (1936)
Bull.geol.soc.Am., 47:339-66 [Coll.Repr. Woods Hole oceanogr. Instn., (80)]
(Rock dredge)

Suyehiro et al. (1960)
Oceanogrl Mag., 11:187-200
(Rectangular sledge dredge)

Tamura (1953)
Bull.Fac.Fish. Hokkaido Univ., 3:240-2
(Tamura bottom snapper)

Taylor (1965)
Chesapeake Sci., 6:233-4
(Bucket dredge)

Ting, Robert Yih-min (1965)
Diss.Abstr. Ann Arbor, 26:2937-8
(Bottom sampling)

Tonolli (1962)
Publ.Staz.zool. Napoli, 32 (Suppl.), 20-9
(Sledge net)

Van Cleve, Ting and Kent (1966)
Limnol.Oceanogr., 11:438-43
(Sampler for demersal animal populations)

Van den Bussche and Houbolt (1964)
Sedimentology, 3:155-9
(Core sampler)

Walker (1964)
Ecology, 45:642-4
(Modified Vallentyne sampler)

Whitley (1962)
Limnol. Oceanogr., 7:265-6
(Sampler for shallow streams)

Wilding (1940)
Spec.Publ.Limnol.Soc.Am., (4):4 p.
(Square-foot sampler)

Williemoës (1964)
Ophelia, 1:235-40
(Core sampler)

Wolff (1961)
Galathea Rep., 5:129-62
(Agassiz trawl with measuring wheel)

Zoutendyk (1964)
Trans.R.Soc.S.Afr., 37:109-10
(Rock dredge)

FAO FISHERIES TECHNICAL PAPER

This is one of a series of Technical Papers (see inside front cover) dealing whith aspects of the work of the FAO Department of Fisheries, Fishery Resources Division, including the review of pertinent information on particular topics, to meet the request for assistance, for presentation to technical and scientific meetings, etc. Extra copies can be obtained by application to:

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FRi/T85		Directory of fish culture research institutions	February 1969
FRv/T87		Computer-aided studies of fishing boat hull resistance	December 1969
FRv/T88	(Fr)	Le coefficient prismatique	Décembre 1969
	(Es)	El coeficiente prismático	Diciembre 1969
FRv/T89	(Fr)	Types de bateau destinés aux pays dont les pêches sont en voie de développement	Décembre 1969
	(Es)	Embarcaciones de pesca para las pesquerías en vías de desarrollo	Diciembre 1969
FRD/T90	(Tri)	Careers in marine science - Carrières en sciences de la mer - Carreras en la ciencia marina	December 1969
FRv/T91		Some geotechnical and geophysical systems and their application to the planning of fishery harbour development programmes in developing countries	December 1969
FRs/T92		Fisheries management and the limitation of fishing	December 1969
FRv/T93		Research fleet of the world	December 1969
FRi/T94		Facsimile of Section III - Fish, other aquatic life, and wildlife, of the Report of the Committee on Water Quality Criteria	December 1969
	(Es)	Facsímil de la Sección III - Peces, otras formas de vida acuática y fauna silvestre del Informe del Comité sobre Criterios de Calidad del Agua	Diciembre 1969
FIRS/T98		International Biological Programme Section PM (Productivity Marine). Bibliography on methods of studying the marine benthos	October 1970

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